Claims 1 to 22 CANCELLED (NEW 7)

I claim:

**23.** (New Claim) **A method** for reducing fuel density while increasing combustion air density, without effecting their specified volume, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels such as natural gas, propane gas and the like, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into energy, such as heat, thrust or torque, comprising:

a) providing fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said fuel through the fuel supply conduit defining a first heat exchanger assembly that extends through a first heat transfer zone related to the combustion mechanism;

c) reducing the density of said fuel by heating the fuel as it flows through said first heat exchanger assembly to an optimal fuel operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

d) maintaining a constant volume of density reduced fuel to the combustion area of said combustion mechanism;

e) providing combustion air for the combustion process in said combustion mechanism;

f) directing said combustion air through an air supply conduit defining a second heat exchanger assembly that extends through a second heat transfer zone of said combustion mechanism;

g) increasing the density of said combustion air by cooling the combustion air as it flows through said second heat exchanger assembly to an optimal air operating temperature level of between plus 50 and minus 25 degrees Fahrenheit;

h) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**24.** (New Claim) A method according to Claim 23, wherein the density reduction of the fuel is stabilised with an insulating or heat storage material forming part of the heat exchanger assemblies.

**25.** (New Claim) A method according to Claim 23, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion mechanism.

**26.** (New Claim) A method according to Claim 23, wherein at least one of said heat transfer zones is related to the combustion area of the combustion mechanism.

**27.** (New Claim) A method according to Claim 23, wherein said heat transfer zones are operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism.

**28.** (New Claim) A method according to Claim 23, wherein said preselected optimal fuel operating temperature range is within the preselected general fuel operating temperature range from 125 degrees to 900 degrees Fahrenheit.

**29.** (New Claim) A method according to Claim 23, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle turbine system.

**30.** (New Claim) A method according to Claim 23, wherein the combustion mechanism is part of a combustion turbine.

**31.** (New Claim) A method according to Claim 23, wherein at least one of the two heat exchanger assemblies is operational.

**32.** (New Claim) A method according to Claim 23, wherein the fluid hydrocarbon fuel includes a suspended coal dust, or a coal dust slurry.

**33.** (New Claim) A method according to Claim 23, wherein the fluid hydrocarbon fuel includes a liquid fuel.

**34.** (New Claim) **A device** for reducing fuel density while increasing combustion air density, without effecting their specified volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels such as natural gas, propane gas and the like, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into energy, such as heat, thrust or torque, comprising:

a) a fuel supply conduit defining a first heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of fluid hydrocarbon fuel to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

b) a combustion air supply conduit defining a second heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between plus 50 and minus 25 degrees Fahrenheit.

**35.** (New Claim) A device according to Claim 34, wherein an insulating material forms part of said heat exchanger assemblies in order to balance any temperature fluctuations occurring in the heat transfer zones.

**36.** (New Claim) A device according to Claim 34, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion mechanism.

**37.** (New Claim) A device according to Claim 34, wherein at least one heat transfer zone is related to the combustion area of the combustion mechanism.

**38.** (New Claim). A device according to Claim 34, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion mechanism.

**39.** (New Claim) A device according to Claim 34, wherein said means to maintain a continuous volume of fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 125 degrees and 900 degrees Fahrenheit.

**40.** (New Claim) A device according to Claim 34, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**41.** (New Claim) A device according to Claim 34, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a related turbine system.

**42.** (New Claim) A device according to Claim 34, wherein the fluid hydrocarbon fuel is a fuel other than natural gas or propane gas.

**43.** (New Claim) A device according to Claim 34, wherein at least one of the two heat exchanger assemblies is operational.

Claims 23 to 43 (Cancelled)

I claim:

**44.** (New Claim) **A method** for reducing fuel density while increasing combustion air density, without effecting their specified volume, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque or other energy, comprising:

a) providing fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said fuel through the fuel supply conduit defining a first heat exchanger assembly that extends through a first heat transfer zone related to the combustion mechanism;

d) reducing the density of said fuel by heating the fuel as it flows through said first heat exchanger assembly to an optimal fuel operating temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level;

i) maintaining a constant volume of density reduced fuel to the combustion area of said combustion mechanism;

j) providing combustion air for the combustion process in said combustion mechanism;

k) directing said combustion air through an air supply conduit defining a second heat exchanger assembly that extends through a second heat transfer zone;

l) increasing the density of said combustion air by cooling the combustion air as it flows through said second heat exchanger assembly to an optimal air operating temperature level of between ambient and minus 40 degrees Fahrenheit;

m) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**45.** (New Claim) A method according to Claim 44, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion mechanism.

**46.** (New Claim) A method according to Claim 44, wherein at least one of said heat transfer zones is related to the combustion area of the combustion mechanism.

**47.** (New Claim) A method according to Claim 44, wherein at least one of the heat transfer zones is operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism.

**48.** (New Claim) A method according to Claim 44, wherein said preselected optimal fuel operating temperature range is within the preselected general fuel operating temperature range from 165 degrees to 900 degrees Fahrenheit.

**49.** (New Claim) A method according to Claim 44, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle turbine system.

**50.** (New Claim) A method according to Claim 44, wherein the combustion mechanism is part of a combustion turbine.

**51.** (New Claim) A method according to Claim 44, wherein at least one of the two heat exchanger assemblies is operational.

**52.** (New Claim) A method according to Claim 44, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**53.** (New Claim) A method according to Claim 44, wherein the fluid hydrocarbon fuel is a liquid fuel.

**54.** (New Claim) **A device** for reducing fuel density while increasing combustion air density, without effecting their specified volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, ~~or~~ torque or other energy comprising:

a) a fuel supply conduit defining a first heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of fluid hydrocarbon fuel to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level;

b) a combustion air supply conduit defining a second heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between ambient and minus 40 degrees Fahrenheit.

**55.** (New Claim) A device according to Claim 54, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion mechanism.

**56.** (New Claim) A device according to Claim 54, wherein at least one heat transfer zone is related to the combustion area of the combustion mechanism.

**57.** (New Claim) A device according to Claim 54, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion mechanism.

**58.** (New Claim) A device according to Claim 54, wherein said means to maintain a continuous volume of fluid hydrocarbon fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 165 degrees and 900 degrees Fahrenheit.

**59.** (New Claim) A device according to Claim 54, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**60.** (New Claim) A device according to Claim 54, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a related turbine system.

**61.** (New Claim) A device according to Claim 54, wherein the fluid hydrocarbon fuel is a fluid fuel other than natural gas or propane gas.

**62.** (New Claim) A device according to Claim 54, wherein the fluid hydrocarbon fuel is supended coal dust, or a coal dust slurry.

**63.** (New Claim) A device according to Claim 54, wherein at least one of the two heat exchanger assemblies is operational.

Claims 44 to 63 (Cancelled) 

I claim:

**64.** (New Claim) **A method** for reducing fuel density while increasing combustion air density, without effecting their specified volume, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque or other energy, comprising:

a) providing fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said fuel through the fuel supply conduit defining a first heat exchanger assembly that extends through a first heat transfer zone related to the combustion mechanism;

e) reducing the density of said fuel by heating the fuel as it flows through said first heat exchanger assembly to an optimal fuel operating temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level;

n) maintaining a constant volume of density reduced fuel to the combustion area of said combustion mechanism;

o) providing combustion air for the combustion process in said combustion mechanism;

p) directing said combustion air through an air supply conduit defining a second heat exchanger assembly that extends through a second heat transfer zone;

q) increasing the density of said combustion air by cooling the combustion air as it flows through said second heat exchanger assembly to an optimal air operating temperature level of between ambient and minus 40 degrees Fahrenheit;

r) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**65.** (New Claim) A method according to Claim 64, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion mechanism.

**66.** (New Claim) A method according to Claim 64, wherein at least one of said heat transfer zones is related to the combustion area of the combustion mechanism.

**67.** (New Claim) A method according to Claim 64, wherein at least one of the heat transfer zones is operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism.

**68.** (New Claim) A method according to Claim 64, wherein said preselected optimal fuel operating temperature range is within the preselected general fuel operating temperature range from 165 degrees to 900 degrees Fahrenheit.

**69.** (New Claim) A method according to Claim 64, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle turbine system.

**70.** (New Claim) A method according to Claim 64, wherein the combustion mechanism is part of a combustion turbine.

**71.** (New Claim) A method according to Claim 64, wherein at least one of the two heat exchanger assemblies is operational.

**72.** (New Claim) A method according to Claim 64, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**73.** (New Claim) A method according to Claim 64, wherein the fluid hydrocarbon fuel is a liquid fuel.

**74.** (New Claim) **A device** for reducing fuel density while increasing combustion air density, without effecting their specified volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque or other energy comprising:

a) a fuel supply conduit defining a first heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of fluid hydrocarbon fuel to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level;

b) a combustion air supply conduit defining a second heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between ambient and minus 40 degrees Fahrenheit.

**75.** (New Claim) A device according to Claim 74, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion mechanism.

**76.** (New Claim) A device according to Claim 74, wherein at least one heat transfer zone is related to the combustion area of the combustion mechanism.

**77.** (New Claim) A device according to Claim 74, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion mechanism.

**78.** (New Claim) A device according to Claim 74, wherein said means to maintain a continuous volume of fluid hydrocarbon fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 165 degrees and 900 degrees Fahrenheit.

**79.** (New Claim) A device according to Claim 74, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**80.** (New Claim) A device according to Claim 74, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a related turbine system.

**81.** (New Claim) A device according to Claim 74, wherein the fluid hydrocarbon fuel is a fluid fuel other than natural gas or propane gas.

**82.** (New Claim) A device according to Claim 74, wherein the fluid hydrocarbon fuel is supended coal dust, or a coal dust slurry.

**83.** (New Claim) A device according to Claim 74, wherein at least one of the two heat exchanger assemblies is operational.

I claim:

**84.** (New Claim) **A method** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) providing a combustion mechanism operating in a combustion turbine system;

b) providing combustible fluid hydrocarbon fuel as fuel for said combustion mechanism;

c) directing said fuel through the fuel supply conduit defining a heat exchanger assembly that extends through a heat transfer zone related to the combustion mechanism;

d) reducing the density of said fuel by heating the fuel as it flows through said heat exchanger assembly to an optimal fuel operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

e) maintaining a constant volume of density reduced combustible fuel to the combustion area of said combustion mechanism;

f) providing combustion air for the combustion process in said combustion mechanism;

g) directing said combustion air through an air supply conduit defining a heat exchanger assembly that is operated in a heat transfer zone of said combustion mechanism;

h) increasing the density of said combustion air by cooling the combustion air as it flows through said heat exchanger assembly to an optimal air operating temperature level of between ambient and minus 40 degrees Fahrenheit;

i) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**85.** (New Claim) A method according to Claim 84, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion turbine system.

**86.** (New Claim) A method according to Claim 84, wherein at least one of said heat transfer zones is related to the combustion area of the combustion turbine system.

**87.** (New Claim) A method according to Claim 84, wherein said heat transfer zones are operated from a source other than the combustion or exhaust gas vent area of the combustion turbine system.

**88.** (New Claim) A method according to Claim 84, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**89.** (New Claim) A method according to Claim 84, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**90.** (New Claim) A method according to Claim 84, wherein at least one of the two heat exchanger assemblies is operational.

**91.** (New Claim) A method according to Claim 84, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**92.** (New Claim) A method according to Claim 84, wherein the fluid hydrocarbon fuel is a liquid fuel.

**93.** (New Claim) **A device** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) a combustion mechanism operating in a combustion turbine system;

b) a fuel supply conduit defining a heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of combustible fluid hydrocarbon fuel to the combustion area of said mechanism at a pre selected optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

c) a combustion air supply conduit defining a heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between ambient and minus 40 degrees Fahrenheit.

**94.** (New Claim) A device according to Claim 93, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion turbine system.

**95.** (New Claim) A device according to Claim 93, wherein at least one heat transfer zone is related to the combustion area of the combustion turbine system.

**96.** (New Claim) A device according to Claim 93, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion turbine system.

**97.** (New Claim) A device according to Claim 93, wherein said means to maintain a continuous volume of fluid hydrocarbon fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 165 degrees and 900 degrees Fahrenheit.

**98.** (New Claim) A device according to Claim 93, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**99.** (New Claim) A device according to Claim 93, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a turbine system.

**100.** (New Claim) A device according to Claim 93, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**101.** (New Claim) A device according to Claim 93, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**102.** (New Claim) A device according to Claim 93, wherein the fluid hydrocarbon fuel is a fluid fuel other than natural gas or propane gas.

**103.** (New Claim) A device according to Claim 93, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**104.** (New Claim) A device according to Claim 93, wherein at least one heat exchanger assemblies is operational.

**105.** (New Claim) A device according to Claim 93, wherein at least one of the two heat exchanger assemblies is operational.

Claims 84 to 105 (Cancelled) 

AMENDED

I claim:

**106.** (New Claim) **A method** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) providing a combustion mechanism operating in a combustion turbine system;

b) providing combustible fluid hydrocarbon fuel as fuel for said combustion mechanism;

c) directing said fuel through the fuel supply conduit defining a heat exchanger assembly that extends through a heat transfer zone related to the combustion mechanism;

d) reducing the density of said fuel by heating the fuel as it flows through said heat exchanger assembly to an optimal fuel operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

e) maintaining a constant volume of density reduced combustible fuel to the combustion area of said combustion mechanism;

f) providing combustion air for the combustion process in said combustion mechanism;

g) directing said combustion air through an air supply conduit defining a heat exchanger assembly that is operated in a heat transfer zone of said combustion mechanism;

h) increasing the density of said combustion air by cooling the combustion air as it flows through said heat exchanger assembly to an optimal air operating temperature level of between ambient and minus 40 degrees Fahrenheit;

i) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**107.** (New Claim) A method according to Claim 106, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion turbine system.

**108.** (New Claim) A method according to Claim 106, wherein at least one of said heat transfer zones is related to the combustion area of the combustion turbine system.

**109.** (New Claim) A method according to Claim 106, wherein said heat transfer zones are operated from a source other than the combustion or exhaust gas vent area of the combustion turbine system.

**110.** (New Claim) A method according to Claim 106, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**111.** (New Claim) A method according to Claim 106, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**112.** (New Claim) A method according to Claim 106, wherein at least one of the two heat exchanger assemblies is operational.

**113.** (New Claim) A method according to Claim 106, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**114.** (New Claim) A method according to Claim 106, wherein the fluid hydrocarbon fuel is a liquid fuel.

**115.** (New Claim) **A device** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) a combustion mechanism operating in a combustion turbine system;

b) a fuel supply conduit defining a heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of combustible fluid hydrocarbon fuel to the combustion area of said mechanism at a pre selected optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

c) a combustion air supply conduit defining a heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between ambient and minus 40 degrees Fahrenheit.

**116.** (New Claim) A device according to Claim 115, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion turbine system.

**117.** (New Claim) A device according to Claim 115, wherein at least one heat transfer zone is related to the combustion area of the combustion turbine system.

**118.** (New Claim) A device according to Claim 115, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion turbine system.

**119.** (New Claim) A device according to Claim 115, wherein said means to maintain a continuous volume of fluid hydrocarbon fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 165 degrees and 900 degrees Fahrenheit.

**120.** (New Claim) A device according to Claim 115, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**121.** (New Claim) A device according to Claim 115, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a turbine system.

**122.** (New Claim) A device according to Claim 115, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**123.** (New Claim) A device according to Claim 115, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**124.** (New Claim) A device according to Claim 115, wherein the fluid hydrocarbon fuel is a fluid fuel other than natural gas or propane gas.

**125.** (New Claim) A device according to Claim 115, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**126.** (New Claim) A device according to Claim 115, wherein at least one of the two heat exchanger assemblies is operational.

AMENDED

I claim:

**106.** (New Claim) **A method** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) providing a combustion mechanism operating in a combustion turbine system;
b) providing combustible fluid hydrocarbon fuel as fuel for said combustion mechanism;
c) directing said fuel through the fuel supply conduit defining a heat exchanger assembly that extends through a heat transfer zone related to the combustion mechanism;
d) reducing the density of said fuel by heating the fuel as it flows through said heat exchanger assembly to an optimal fuel operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;
e) maintaining a constant volume of density reduced combustible fuel to the combustion area of said combustion mechanism;
f) providing combustion air for the combustion process in said combustion mechanism;
g) directing said combustion air through an air supply conduit defining a heat exchanger assembly that is operated in a heat transfer zone of said combustion mechanism;
h) increasing the density of said combustion air by cooling the combustion air as it flows through said heat exchanger assembly to an optimal air operating temperature level of between ambient and minus 40 degrees Fahrenheit;
i) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

**107.** (New Claim) A method according to Claim 106, wherein at least one of said heat transfer zones is related to the exhaust gas vent area of the combustion turbine system.

**108.** (New Claim) A method according to Claim 106, wherein at least one of said heat transfer zones is related to the combustion area of the combustion turbine system.

**109.** (New Claim) A method according to Claim 106, wherein said heat transfer zones are operated from a source other than the combustion or exhaust gas vent area of the combustion turbine system.

**110.** (New Claim) A method according to Claim 106, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**111.** (New Claim) A method according to Claim 106, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**112.** (New Claim) A method according to Claim 106, wherein at least one of the two heat exchanger assemblies is operational.

**113.** (New Claim) A method according to Claim 106, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**114.** (New Claim) A method according to Claim 106, wherein the fluid hydrocarbon fuel is a liquid fuel.

**115.** (New Claim) **A device** for improving the combustion efficiency of a combustion mechanism operating with combustible fluid hydrocarbon fuel, through reducing the density of said combustible fuel while increasing the density of the combustion air, without effecting the for the mechanism specified fuel or combustion air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence increasing oxygen volume percentage, during the process of ignition and combustion of all said combustible fuels, including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque, or other form of energy, comprising:

a) a combustion mechanism operating in a combustion turbine system;

b) a fuel supply conduit defining a heat exchanger assembly located in a heating zone related to the combustion area of the mechanism, providing the means to maintain a constant supply of combustible fluid hydrocarbon fuel to the combustion area of said mechanism at a pre selected optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto ignition level;

c) a combustion air supply conduit defining a heat exchanger assembly located in a cooling zone related to the combustion mechanism, providing the means to maintain a constant volume of combustion air to the combustion area of said mechanism at a preselected optimal operating temperature level ranging between ambient and minus 40 degrees Fahrenheit.

**116.** (New Claim) A device according to Claim 115, wherein at least one heat transfer zone is related to the exhaust gas vent area of the combustion turbine system.

**117.** (New Claim) A device according to Claim 115, wherein at least one heat transfer zone is related to the combustion area of the combustion turbine system.

**118.** (New Claim) A device according to Claim 115, wherein the heat transfer zones are related to an operating source other than the combustion or exhaust gas vent area of the combustion turbine system.

**119.** (New Claim) A device according to Claim 115, wherein said means to maintain a continuous volume of fluid hydrocarbon fuel to the burners in the combustion area of the mechanism at said optimal fuel temperature level operates within a preselected operating temperature range between 165 degrees and 900 degrees Fahrenheit.

**120.** (New Claim) A device according to Claim 115, wherein a preselected volume of combustion air is routed through a contained duct system which provides temperature control and the means for density increase of said combustion air volume by cooling the air to a preselected temperature range below ambient prior to combustion.

**121.** (New Claim) A device according to Claim 115, which provides the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products for the purpose of operating a turbine system.

**122.** (New Claim) A device according to Claim 115, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a single or dual cycle combustion turbine system.

**123.** (New Claim) A device according to Claim 115, wherein the combustion mechanism converts the oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a turbine engine.

**124.** (New Claim) A device according to Claim 115, wherein the fluid hydrocarbon fuel is a fluid fuel other than natural gas or propane gas.

**125.** (New Claim) A device according to Claim 115, wherein the fluid hydrocarbon fuel is suspended coal dust, or a coal dust slurry.

**126.** (New Claim) A device according to Claim 115, wherein at least one of the two heat exchanger assemblies is operational.

I claim: (NEW 7)

1. **A method** for improving the combustion efficiency of a combustion mechanism operating with fluid hydrocarbon fuel, having an ignition and combustion area therein to convert said fuel into heat, thrust, torque or other type of energy, resulting in the reduction of fuel consumption and harmful emissions without effecting performance output of the combustion mechanism, comprising:

a) providing a constant volume of ambient temperature fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said constant volume of fuel through a primary fuel supply conduit defining a fuel heat exchanger assembly that extends through a heating zone having a fuel inlet and a fuel outlet;

c) reducing fuel density by reducing fuel mass in said constant volume of fuel through heating the fuel to an optimal operating temperature of between 100 degrees Fahrenheit and the fuel's auto-ignition temperature as it flows through said fuel heat exchanger assembly;

d) maintaining a constant volume of heated low density fuel for ignition in the combustion area of said combustion mechanism;

e) providing a constant volume of ambient temperature air as combustion air for said combustion mechanism.

f) directing said constant volume of combustion air through a primary air supply conduit defining an air heat exchanger assembly that extends through a cooling zone having an air inlet and an air outlet.

g) increasing air density by increasing air mass in said constant volume of combustion air through cooling the combustion air to an optimal operating temperature of between combustion mechanism ambient temperature and minus 40 degrees Fahrenheit as it flows through said air heat exchanger assembly;

h) maintaining a constant volume of cooled high density air for combustion in the combustion-area of said combustion mechanism;

2. A method according to Claim 1, wherein the fuel heat exchanger assembly is operated with heat generated from the combustion mechanism.

**3.** A method according to Claim 1, wherein the fuel heat exchanger assembly is operated with means other than heat generated from the combustion mechanism.

**4.** A method according to Claim 1, wherein the preselected optimal fuel operating temperature level is at a constant range between 155 degrees Fahrenheit and 900 degrees Fahrenheit.

**5.** A method according to Claim 1, wherein the combustion air heat exchanger assembly is operated with low temperature generated from the flow of the low temperature fuel supply.

**6.** A method according to Claim 1, wherein the combustion air heat exchanger assembly is operated with means other than the flow of the low temperature fuel supply.

**7.** A method according to Claim 1, wherein the preselected optimal combustion air operating temperature level is maintained at a constant range between plus 30 and minus 40 degrees Fahrenheit.

**8.** A method according to Claim 1, wherein the combustion mechanism is a single or dual cycle power generator.

**9.** A method according to Claim 1, wherein the combustion mechanism is a combustion turbine.

**10.** A method according to Claim 1, wherein the combustion mechanism is a rotary kinetic fluid motor.

**11.** A method according to Claim 1, wherein at least one heat exchanger assembly is operational.

**12.** **A combination of devices** operational in accordance with the disclosed method for improving the combustion efficiency of a combustion mechanism operating with fluid hydrocarbon fuel, having an ignition and combustion area therein to convert said fuel into heat, thrust, torque or other type of energy, providing the means for the reduction of fuel consumption and harmful emissions without effecting performance output of the combustion mechanism, comprising:

a) a first housing means defining a heating zone;

b) a fuel supply conduit defining a fuel heat exchanger assembly extending through said heating zone, providing the primary conveyance of fuel to the combustion area of the combustion mechanism, having a fuel inlet and a fuel outlet

c) a fuel heat exchanger assembly to maintain a constant volume of low density fuel supply to the combustion area of said combustion mechanism at a preselected optimal operating temperature range of between 100 degrees Fahrenheit and the fuel's auto-ignition temperature;

d) means to maintain a constant volume of low density heated fuel for combustion in the combustion area of said combustion mechanism;

e) a second housing means defining a coling zone;

f) a combustion air supply conduit defining a combustion air heat exchanger assembly extending through said cooling zone, providing the primary conveyance of combustion air to the combustion area of the combustion mechanism, having an air inlet and an air outlet;

g) a combustion air heat exchanger assembly to maintain a constant volume of high density cooled combustion air supply to the combustion area of said combustion mechanism at a preselected optimal operating temperature range of between ambient and minus 40 degrees Fahrenheit;

h) means to maintain a constant volume of high density cooled air for combustion in the combustion area of said combustion mechanism.

**13.** A heating zone according to Claim 12, wherein the fuel heat exchanger assembly is operated with heat generated from the combustion mechanism.

**14.** A heating zone according to Claim 12, wherein the fuel heat exchanger assembly is operated with means other than heat generated from the combustion mechanism.

**15.** A fuel heat exchanger assembly in a heating zone according to Claim 12, designed to heat the fuel to a preselected optimal constant fuel operating temperature level of between 155 degrees Fahrenheit and 900 degrees Fahrenheit.

**16.** A cooling zone according to Claim 12, wherein the combustion air heat exchanger assembly is operated with low temperature generated from the flow of the low temperature fuel supply.

**17.** A cooling zone according to Claim 12, wherein the combustion air heat exchanger assembly is operated with means other than the low temperature of the fuel supply flow.

**18.** A combustion air heat exchanger assembly in a cooling zone according to Claim 14, designed to cool the combustion air to a preselected optimal constant combustion air operating temperature level of between plus 30 and minus 40 degrees Fahrenheit.

**19.** A combination of devices according to Claim 12, wherein the combustion mechanism is a single or dual cycle power generator.

**20.** A combination of devices according to Claim 12, wherein the combustion mechanism is a combustion turbine.

**21.** A combination of devices according to Claim 12, wherein the combustion mechanism is a rotary kinetic motor.

**22.** A combination of devices according to Claim 12, wherein at least one heat exchanger assembly is operational.